

### Moosehorn NWR Wilderness Character Monitoring Summary

The table and the report that follow are part of a national initiative to establish a baseline wilderness character assessment for all of the National Wildlife Refuges with designated wilderness. The measures for each wilderness were developed with refuge staff and reviewed at the national level. This addendum document complements the 2011 report on wilderness character monitoring for Moosehorn National Wildlife Refuge.



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## Moosehorn NWR Wilderness Character Monitoring Summary Table

The following table summarizes the original measures selected by refuge staff for wilderness character monitoring in 2011 and reflects any modifications that were made in 2015 to comply with the revised monitoring protocol of *Keeping it Wild 2*. The reasoning for adding, removing or modifying measures is explained in the narrative section below the table. This table describes each measure, the quality that it informs, and how often data are collected for the measure. As professionals at the refuge have developed these measures with a Wilderness Fellow, it is expected that these measures will form the basis of wilderness character monitoring in the Inventory and Monitoring Plan that is submitted by the refuge to the region.

### Wilderness Character Monitoring Measure attributes for the Moosehorn NWR Wilderness

Quality	Indicator	Measure	Frequency	Data Adequacy	Significant Change	Baseline <sup>1</sup> Value
Untrammeled	Actions authorized by the federal land manager that intentionally manipulate the biophysical environment	Number of actions to manipulate plants, wildlife, insects, fish, pathogens, soil, water, or fires	Annually	High	Any	1
		Percentage of natural fire starts that received a suppression response within wilderness	Annually	High	Any	0
		Number of lakes and other water bodies stocked with fish	Annually	High	Any	0
	Actions not authorized by the federal land manager that intentionally manipulate the biophysical environment	Number of unauthorized actions by agencies, citizen groups, or individuals that manipulate plants, wildlife, insects, fish, pathogens, soil, water, or fire	Annually	Medium	Any	0
Natural	Plants	Number of invasive non-native plant species	5 years	High	Any	0

<sup>1</sup> The baseline value is defined as the data value entered into the Wilderness Character Monitoring Database from the first year of available data for a particular measure. An individual measure's baseline year may be different from the baseline year of Wilderness Character Monitoring as a whole.

Quality	Indicator	Measure	Frequency	Data Adequacy	Significant Change	Baseline <sup>1</sup> Value
	Animals	Index of native wildlife species that are listed as threatened and endangered, candidate, or of special concern	5 years	High	Any	4
		Number of extirpated indigenous wildlife species	5 years	High	Any	4
		Vernal pool habitat quality	Annually	High	Staff Judgment	273 egg masses
	Air and water	Ozone air pollution	5 years	Medium	Categorical	62.1 ppb
		Total nitrogen wet deposition	5 years	Medium	Categorical	3.1 kg/ha
		Total sulfur wet deposition	5 years	Medium	Categorical	3.7 kg/ha
		Visibility	5 years	Medium	Categorical	5.2 Dv
	Ecological processes	Departure from natural fire regimes average over the wilderness	5 years	Medium	Any	1
		Area and magnitude for pathways for movement of non-native species into the wilderness	5 years	High	20%	5633.9 acres
Undeveloped	Presence of non-recreational structures, installations, and developments	Number of authorized physical developments	5 years	High	Any	6
		Number of culverts removed	5 years	High	Any	0
	Presence of inholdings	Number of inholdings within wilderness	5 years	High	Any	0
	Use of motor vehicles, motorized equipment, or mechanical transport	Type and amount of emergency use of motor vehicles, motorized equipment, or mechanical transport	Annually	High	Any	0
		Type and amount of motor vehicles,	Annually	Medium	Any	0

Quality	Indicator	Measure	Frequency	Data Adequacy	Significant Change	Baseline <sup>1</sup> Value
Solitude or primitive and unconfined recreation		motorized equipment, or mechanical transport use not authorized by Refuge manager				
	Remoteness from sights and sounds of human activity <i>inside</i> wilderness	Amount of visitor use	Annually	Medium	50%	440
		Number of hours spent maintaining trail	Annually	High	20%	80
		Number of trail contacts	Annually	Medium	20%	15
		Area of wilderness affected by access or travel routes that are inside the wilderness	5	High	Any	4008.8 acres
	Remoteness from sights and sounds of human activity <i>outside</i> the wilderness	Area of wilderness affected by access or travel routes that are adjacent to the wilderness	5	High	Any	2875.5 acres
	Facilities that decrease self-reliant recreation	Type and number of agency-provided recreation facilities	5 years	High	Any	0
		Miles of agency-provided system trails	5 years	High	≥ 1 mile	16.6 mi.
	Management restrictions on visitor behavior	Number and extent of management restrictions	5 Years	High	Any	9
Other features of value	Deterioration or loss of integral cultural features	Number and severity of disturbances to cultural resources	5 Years	High	Any	0

The following people participated in the drafting of the new measures and the summary table above:

William Kolodnicki – Refuge Manager

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## Narrative

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In March and April of 2015 Wilderness Fellow Max Mutter worked with William Kolodnicki to discuss the recent changes in the monitoring framework of *Keeping it Wild 2*. From the discussion a small number of things were modified or removed from the original 2011 wilderness character monitoring report to comply with the updated version of *Keeping it Wild*.

### Untrammelled quality

Indicator:	Actions authorized by the federal land manager that intentionally manipulate the biophysical environment
Measure:	Number of actions to manipulate plants, wildlife, insects, fish, pathogens, soil, water, or fires
Change:	The protocol for this measure has been adjusted to align with the current method of monitoring the decision to trammel, rather than the magnitude of trammeling (see the updated measure description at the end of this document). In that vein the baseline value has been adjusted to count affixing radio transmitters on spruce grouse as one action in aggregate rather than counting each individual affixed with a radio transmitter as one action. Additionally, with the removal of the Number of person-hours spent treating invasive plant species measure this measure now also accounts for actions taken to manage invasive plant species. Finally, in light of the new method of counting actions the significant change value has been changed from 20% to any.

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Indicator:	Actions authorized by the federal land manager that intentionally manipulate the biophysical environment
Old Measure:	Number of natural fire starts that received a suppression response within wilderness
Change:	This measure was changed from a simple count to a percentage. Using a percentage better accounts for the fact that there can be different numbers of natural fires each year. See the updated measure description at the end of this document.
Updated Measure:	Percentage of natural fire starts that received a suppression response within wilderness

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Indicator:	Actions authorized by the federal land manager that intentionally manipulate the biophysical environment
Old Measure:	Number of person-hours treating invasive plant species
Change:	This measure tracked the magnitude of trammeling rather than the decision to trammel. As the baseline value for this measure was zero it made sense to move consideration of invasive plant manipulation into the pre-existing Number of actions to manipulate plants, wildlife, insects, fish, pathogens, soil, water, or fires measure.

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Updated Measure:	Number of actions to manipulate plants, wildlife, insects, fish, pathogens, soil, water, or fires
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Indicator:	Actions not authorized by the federal land manager that intentionally manipulate the biophysical environment
Measure:	Number of unauthorized actions by agencies, citizen groups, or individuals that manipulate plant, wildlife, insects, fish, pathogens, soil, water, or fire
Change:	This measure protocol was adjusted slightly to be consistent with the new Actions authorized by the federal land manager that intentionally manipulate the biophysical environment measure. Also, a note about potential future fish stocking was added to the measure description (see the updated measure description at the end of this document).
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## Natural quality

Indicator:	Animals
Old Measure:	Number of native wildlife species that are listed as threatened and endangered, candidate, or of special concern
Change:	This measure assigns scores to listing species based on the level of their listing status and then sums these scores to arrive at a final measure value. Therefore the word 'number' in the measure title was replaced with the word 'index' in order to better reflect the construction of the measure.
Updated Measure:	Index of native wildlife species that are listed as threatened and endangered, candidate, or of special concern
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## Undeveloped quality

No Measures were changed in the Undeveloped Quality.

## Solitude or primitive and unconfined recreation quality

Indicator:	Remoteness from sights and sounds of human activity <i>inside</i> wilderness
Old Measure:	Number of person-hours maintaining trails

**Change:** This measure was originally under the Untrammelled quality and tracked the amount of time spent maintaining trails within wilderness. As trail maintenance does not carry with it the specific intent to alter the biophysical environment, nor has trail maintenance been conducted on a large enough scale for significant alteration of the biophysical environment to be a clear and unavoidable consequence, it does not constitute a trammeling action. This measure has been moved to the Solitude and primitive or unconfined recreation quality as trail workers present a sight of human activity within wilderness. Additionally, as trail work tends to be done by a single small group at a time the measure has been changed to track hours of maintenance rather than person-hours. See the updated measure description at the end of this document.

**Updated Measure:** Number of hours maintaining trails

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**Indicator:** Remoteness from sights and sounds of human activity *inside* wilderness  
**Measure:** Number of trail contacts

**Change:** This measure had not been implemented at the time of the baseline report but has since been implemented. The baseline year has been established as 2014 and the baseline value has been established as 15. Additionally the frequency has been established as annually and the significant change value has been established as 20%.

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**Indicator:** Remoteness from sights and sounds of human activity *inside* wilderness  
**Old Measure:** Number and condition of campsites within wilderness

**Change:** This measure was constructed to count the number of campsites within wilderness as a proxy for the potential of encountering other people within wilderness. As such it was placed under the Remoteness from sights and sounds of human activity inside wilderness indicator. At the time of the baseline report no campsites had been established in the wilderness but it seemed likely that they would be in the future. It has since been determined that campsites are better accounted for under the Facilities that decrease self-reliant recreation indicator, and that campsites can be counted under the pre-existing Type and number of agency-provided recreation facilities measure. Therefore this measure has been removed and any new campsites will be counted under the Type and number of agency-provided recreation facilities measure.

**Updated Measure:** Type and number of agency-provided recreation facilities

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**Other features of value quality**

Indicator:	Deterioration or loss of integral historic or cultural features
Old Measure:	Number and severity of disturbances to cultural resources
Change:	This measure was included under the old required Loss of statutorily protected cultural resources indicator. Cultural resources have now been moved to the optional Other features of value indicator. In light of this change this measure has been relocated to the Other features of value quality. Although the Moosehorn wilderness is not known to contain any significant cultural resources this measure has been retained as exhaustive surveys for cultural resources have not been completed.

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## UNTRAMMELED QUALITY

### Actions authorized by the federal land manager that manipulate the biophysical environment

**Measure:** Number of actions to manipulate plants, wildlife, insects, fish, pathogens, soil, water, or fires

**Background & Context:** (Modified from the baseline report) This measure excludes actions related to any of the other measures under this indicator (i.e. suppression of natural fire starts of stocking water bodies with fish). Action refers to an intentional decision to manipulate the biophysical environment. The focus is on agency actions that represent larger scale manipulations of populations, communities, and disturbance processes rather than smaller scale, localized manipulations. For example, the creation of vernal pool habitat would be counted as an action; removal of a single hazard tree would not be counted as an action. An action may be purposeful (i.e. resource protection) and management reasoning may be provided. The untrammeled quality is degraded if the number of authorized actions that manipulate the biophysical environment increases.

**Measure Description & Collection Protocol:** The total number of actions taken to manipulate plants, wildlife, insects, fish, pathogens, soil, water, or fires within wilderness, exclusive of actions accounted for in other measures (fish stocking and suppression of natural fire starts). Actions are counted according to the counting actions table below.

**Data Source:** Refuge staff

**Data Adequacy:** High. Refuge staff are aware of authorized manipulations, therefore data quality is high and data quantity is complete.

**Frequency:** Annually

**Significant Change:** Any change is considered significant

Counting the number of trammeling actions in the Moosehorn Wilderness (adapted from the Forest Service Wilderness Character Technical Guide)		
Type of action	Example	Counting rule
Single action at a single location	Herbicide applied at a single location to manage an invasive plant species, or radio transmitters affixed to spruce grouse at a single location	Count as one action
Single action at multiple locations	Herbicide applied at multiple locations, or radio transmitters affixed to spruce grouse at multiple locations	Count as one action for the single action type regardless of the number of locations
Multiple actions at a single location	Both herbicide and mechanical manipulation is used to manage an invasive plant species at a single location, or herbicide is used at a single location to treat two	Count as multiple actions, in both of these cases two (in the first case 2 action types=2 actions, in the second case 2 species=2 actions)

	different invasive plant species	
Multiple actions at multiple locations	Both herbicide and mechanical manipulation is used to manage an invasive plant species at multiple locations	Count as multiple actions, in this case two (one for each action type)
How the time frame of actions affects counting		
Time frame of action	Counting rule	
Action occurs within a single fiscal year	Count as one action regardless of the number of times the action is undertaken within a single fiscal year	
Action spans multiple fiscal years	Count as multiple actions, one for each fiscal year in which the action occurs	

**Measure:** Percentage of natural fire starts that received a suppression response within wilderness

**Background & Context:** (Modified from the baseline report) Natural fires are infrequent occurrences in the Wilderness Area, and also the larger landscape. There have been no documented fires within the Baring Division Wilderness. There have been two wildfires within the Edmunds Division in 1985 and 2001. Future changes in climate may alter fire frequency, intensity, and character. Only fires that were naturally ignited are included in this measure- fires that were human-caused are not included. A suppression response counts only if the action is taken within the Wilderness Area- it is not counted if it occurs outside the boundary. The untrammeled quality is degraded by an increasing number of natural fire starts that are suppressed.

**Measure Description & Collection Protocol:** The percentage of naturally ignited fires within the wilderness that are suppressed, calculated via the following formula:

$$(\# \text{ naturally ignited fires suppressed} / \# \text{ naturally ignited fires}) \times 100$$

**Data Source:** Fire management specialist

**Data Adequacy:** High. All naturally ignited fires within wilderness are recorded, therefore data quantity is high and data quantity is complete.

**Frequency:** Annually

**Significant Change:** Any change is considered significant

**Measure:** Number of unauthorized actions by agencies, citizen groups, or individuals that manipulate plants, wildlife, insects, fish, pathogens, soil, water, or fire

**Background & Context:** (Modified from the baseline report) Known unauthorized actions are limited within wilderness. This measure would allow flexibility to monitor any unauthorized actions as they may arise. This measure tracks unauthorized actions rather than violations because some actions may not be citable yet still be unauthorized actions that trammel the wilderness. The untrammelled quality is degraded if the number of unauthorized actions that manipulate the biophysical environment increases.

At the time of the baseline report the state of Maine was introducing salmon to Hobart stream for experimental purposes. Introductions occurred in a portion of the stream that is outside of the refuge but that is connected to water bodies within the wilderness. These introductions involved a small amount of individuals without the intent or result of manipulating populations within the wilderness and no additional introductions have occurred in the intervening years. However, this situation should be monitored as larger scale introductions in these areas could constitute unauthorized trammeling actions if they are deemed to carry the intent of manipulating fish populations within the wilderness.

**Measure Description & Collection Protocol:** Each separate action is counted and tallied annually. Actions are counted according to the counting actions table in the Number of actions to manipulate plants, wildlife, insects, fish, pathogens, soil, water, or fires measure description. This includes unauthorized species takings, species releases, arson fire starts, and large-scale trash-dumping within wilderness. This does not include minor infractions such as littering, small-scale vandalism, or insignificant trespassing.

**Data Source:** Law Enforcement Officer, Incident Reports and/or RAPP; Biologist

**Data Adequacy:** Medium. It cannot be guaranteed that all unauthorized actions occurring in the wilderness are known. Therefore data quality is medium and data quantity is partial.

**Frequency:** Annually

**Significant Change:** Any change in the number of unauthorized trammeling actions is considered significant.

**Measure:** Number of hours spent maintaining trail

**Background & Context:** Every year small groups perform minimal maintenance on the network of trails within the wilderness. In general there is one group conducting trail maintenance within wilderness at a time. Trail workers within wilderness affect the solitude aspect of wilderness.

**Measure Description & Collection Protocol:** The number of hours each year that trail maintenance is conducted within wilderness. An increase in the time spent on trail maintenance degrades the Solitude or primitive and unconfined recreation quality.

**Data Source:** Biologist, Refuge Manager

**Data Adequacy:** High

**Frequency:** Annually

**Significant Change:** A change of 20% or more is considered significant

## Moosehorn NWR Wilderness Character Monitoring Data Update

As part of this process the most current data relating to wilderness character monitoring at Moosehorn NWR was compiled. The following table reflects all of the measure values calculated from data collected from the creation of the baseline report in 2011 until the completion of this update in 2015. The following data should also be entered into the wilderness character monitoring online database.

### Updated Wilderness Character Monitoring Measure data for Moosehorn Wilderness

Quality	Measure	Frequency	Baseline Year	Measure Values			
				2011	2012	2013	2014
Untrammeled	Number of actions to manipulate plants, wildlife, insects, fish, pathogens, soil, water, or fires	Annually	2011	1	0	0	0
	Percentage of natural fire starts that received a suppression response within wilderness	Annually	2011	0	0	0	0
	Number of lakes and other water bodies stocked with fish	Annually	2011	0	0	0	0
	Number of unauthorized actions by agencies, citizen groups, or individuals that manipulate plants, wildlife, insects, fish, pathogens, soil, water, or fire	Annually	2011	0	0	0	0
Natural	Number of invasive non-native plant species	5 years	2011	0			
	Index of native wildlife species that are listed as threatened and endangered, candidate, or of special concern	5 years	2011	4			
	Number of extirpated indigenous wildlife species	5 years	2011	4			

Quality	Measure	Frequency	Baseline Year	Measure Values			
				2011	2012	2013	2014
	Vernal pool habitat quality	Annually	2011	273 egg masses	269 egg masses	373 egg masses	180 egg masses
	Ozone air pollution	5 years	2009	62.1 ppb			
	Total nitrogen wet deposition	5 years	2009	3.1 kg/ha			
	Total sulfur wet deposition	5 years	2009	3.7 kg/ha			
	Visibility	5 years	2009	5.2 Dv			
	Departure from natural fire regimes average over the wilderness	5 years	2011	1			
	Area and magnitude for pathways for movement of non-native species into the wilderness	5 years	2011	5633.9 acres			
Undeveloped	Number of authorized physical developments	5 years	2011	6			
	Number of culverts removed	5 years	2011	0			
	Number of inholdings within wilderness	5 years	2011	0			
	Type and amount of emergency use of motor vehicles, motorized equipment, or mechanical transport	Annually	2011	0	0	0	0
	Type and amount of motor vehicles, motorized equipment, or mechanical transport use not authorized by Refuge manager	Annually	2011	0	0	0	0

Quality	Measure	Frequency	Baseline Year	Measure Values			
				2011	2012	2013	2014
Solitude or primitive and unconfined recreation	Amount of visitor use	Annually	2011	440	50	50	50
	Number of hours spent maintaining trail	Annually	2011	80	80	80	80
	Number of trail contacts	Annually	2014				15
	Area of wilderness affected by access or travel routes that are inside the wilderness	5 years	2011	4008.8 acres			
	Area of wilderness affected by access or travel routes that are adjacent to the wilderness	5 years	2011	2875.5 acres			
	Type and number of agency-provided recreation facilities	5 years	2011	0			
	Miles of agency-provided system trails	5 years	2011	16.6 mi.			
	Number and extent of management restrictions	5 Years	2011	9			
Other features of value	Number and severity of disturbances to cultural resources	5 Years	2011	0			